amended to provide antecedent basis for the claims as requested by the examiner. No new matter has been added.

III.

Reference numerals 12a, 12b, 14a, and 21a have been added to the drawings. A letter requesting approval of drawing changes is submitted herewith showing the added reference numerals in red.

IV.

Claims 45, 49-52, and 54-72 stand rejected under 35 USC 112, first paragraph, as lacking an adequate written description. The examiner contends that "Nowhere in the original disclosure is there support for (1) the beam steering assembly is placed/disposed within the upper cavity (claims 45 and 55), (2) the primary optical element is provided within the V-groove (claim 49), (3) the features recited in claims 50-52 and 54, (4) a hinge for flexibly connecting the beam steering assembly with an upper edge of the cavity (claim 55), (5) a suspended bridge spanning the primary optical path at a juncture between the primary optical path and the upper cavity (claim 56), (6) the frame is connected to the upper surface of the substrate body (claims 59, 63 and 66), and (7) a beam steering assembly rigidly affixed in a predetermined orientation within at least a portion of the upper cavity (claim 70)."

Claim 45 recites "the beam steering assembly is placed at a predetermined orientation within the upper cavity...." The beam steering assembly comprises the portion 12a of the plate 12 and the micro-machined mirrors 17 and 18 illustrated in Figs. 2-5, 18, 20, and 21, and it is clearly disposed within the cavity 21 of the single substrate 14. That is, the edges 12b of the substrate portion 12a of the plate 12 are beveled so that they nest within the cavity 21 as clearly illustrated in Figs. 2-5, 18, 20, and 21.

Claim 55 recites "the beam steering assembly is disposed within the upper cavity...." The beam steering assembly 12a and the micro-machined mirrors 17 and 18 are clearly disposed in the upper cavity as shown in Figs. 2-5, 18, 20, and 21 for the reasons stated above with respect to the corresponding limitation in claim 45.

Claim 49 recites "the primary element is provided within the V-groove." The single substrate 14 is provided with a V-groove 14a which receives the optical element 13 as illustrated in Figs. 1-3, 18, 20, and 21.

Claim 50 has been amended and as amended recites "wherein the primary optical element is selected from the group consisting of optical waveguides, light detectors, beam splitters, and lasers." The optical fiber 13 illustrated in Figs. 1-3, 18, 20, and 21 is a waveguide. A beam splitter 111 is illustrated in Fig. 19a and described on page 12 lines 12-19. A light detector 64 is illustrated in Fig. 19a and described on page 12 lines 12-19. Support for a laser is found, inter alia, on page 6 lines 22-23.

Claim 51 recites "the substrate body is formed of a crystal having a differential etch rate between different crystallographic planes." Support for that limitation may be found on page 5 lines 2-3 where the spacer (i.e., the single substrate) is described as "silicon which is etched to form opening 21 which forms a <111> face 22." Silicon has a differential etch rate between different crystallographic planes (i.e., crystallographic planes <100>, <110>, and <111>) and therefore the noted limitation is inherently supported by applicants' original disclosure.

Claim 52 provides "at least one cavity is anisotropically etched into the substrate body." Support for that limitation in the original disclosure is found, inter alia, on page 17 lines 14-16.

Claim 54 has been amended and as amended recites "wherein the cover plate is

formed from fused silica." Support for the noted limitation is found, inter alia, on page 4 lines 29-30 of the original disclosure. Fused silica may be optically transparent, translucent, or opaque (see Kirk-Othmer, Third Edition, 1982, Vol. 20, page 782 third paragraph - copy attached).

Claim 55 recites "a hinge for flexibly connecting the beam steering assembly with an upper edge of the upper cavity...." The hinges 57 illustrated in Fig. 2 flexibly connect the beam steering assembly 17, 18 with an upper edge of the upper cavity 14 by way of the support portion 12a of the support plate 12. That is, as mentioned above, the beveled edges 12b of the support portion 12a of the support plate 12 nest within and against the upper edge 21a of the cavity 21.

Claim 56 recites "a suspended bridge spanning the primary optical path at a juncture between the primary optical path and the upper cavity...." The suspended bridge referred to in the noted recitation is the portion 12a of the support plate 12 which, as clearly shown in Fig. 3, spans the primary optical path at a juncture between the primary optical path and the upper cavity. The primary optical path is the path that the light beam follows from the optical element 13 to the point 26 on the sample plane as illustrated in Fig. 3.

Claim 59 recites "wherein the frame... is connected to the upper surface of the substrate body.... " As shown, e.g., in Fig. 3, the portion 12a of the plate 12 corresponds to the claimed frame. That frame is nested in the upper cavity 21 along the upper edge 21a thereof, thereby connecting the frame to the upper surface of the cavity. Moreover, the frame is connected to the upper surface of the substrate by way of the substrate 11 as illustrated, e.g., in Fig. 3.

The corresponding limitation in claims 63 and 66 is supported in the original disclosure in the same manner as discussed above with respect to claim 59.

Claim 70 recites "a beam steering assembly rigidly affixed in a predetermined orientation within at least a portion of the upper cavity---." As noted above, the portion 12a of the plate 12 is nested in the cavity 21 of the substrate 14 by way of the beveled edges 12b on the portion 12a. The portion 12a of the plate 12 and the substrate 14 are rigid members, and therefore the nesting of the portion 12a within the cavity 21 results in the beam steering assembly being rigidly affixed within the upper cavity.

In view of the above remarks, applicants respectfully request that the rejection of claims 45, 49-52, and 54-72 under 35 USC 112, first paragraph, be withdrawn.

V.

The examiner's attention is next invited to the rejection of claims 44-72 under 35 USC 112, first paragraph, as lacking an adequate written description. The examiner stated "To partially support for [?] the claimed invention[,] applicants have assumed that the scanning optical microscope is at an upside down position. However, nowhere in the original disclosure is there a teaching or suggestion that the disclosed scanning optical microscope is operable at the upside down position." This rejection is respectfully traversed.

It is clear from the proposed uses of the disclosed invention that applicants intended the microscope to be used in any desired orientation, including an orientation upside down from that illustrated in, e.g., Fig. 3. For example on page 1 lines 13-22, the original disclosure stated:

> Consequently, there is a need for a small microscope which could be used for observations of melanomas of the skin, and the teeth and gums, and for endoscopy of cells inside arteries and veins and organs of the body. Ultimately, if such a microscope could be mounted inside a hypodermic needle, it would be suitable for taking *in vivo* biopsies and for observing microscopic features of the body, such as the flow of blood and plasma in veins, arteries, and other vessels of the body, the fluid in tear ducts, and the general condition of small vessels. Although we have described biological

> applications of a miniature microscope, the miniature microscope of the present invention can be used in endoscopes passed through small pipes, and for use *in-situ* observation during processing of semiconductors and other materials.

Further support in the original disclosure can be found at, inter alia, page 18 lines 11-16. That disclosure reads as follows:

> Referring to Figure 28, a micromachined microscope 155 in accordance with the present invention is shown mounted on a PST Bimorph 156 inside a hypodermic needle tubing 157 having a window 158. By applying suitable voltages to the bimorph, the microscope 155 can be deflected to focus at various sample planes 159. The hypodermic tubing is shown mounted to a cable 161 which houses the optical fiber, the leads for driving the scan mirror electrodes, and receiving signals from the detector 64 from the scanning head. The micromachined confocal microscope can also be mounted for use in dentistry, dermatology, etc.

In order to be used for observations of the skin, teeth, gums, inside veins, arteries, other vessels of the body, small pipes, and for *in-situ* observation during processing of semiconductors and other materials, it is clear that the invention as originally disclosed must be capable of use with the lens 19 directed towards the sample under investigation whether that sample is above, below, or otherwise oriented with respect to the lens.

In view of the above remarks, applicants respectfully request that the rejection of claims 44-72 under 35 USC 112, first paragraph, be withdrawn.

VI.

The examiner's attention is next invited to the rejection of claims 59-69 under 35 USC 112, second paragraph as being indefinite. The examiner contends that the phrase "towards one surface" in claims 59, 63, and 66 is indefinite since it is not clear what surface is being referred to. Claims 59, 63, and 66 have been amended to change "one surface" to --a surface of the substrate--. Applicants submit that claims 59, 63, and 66, as amended, clearly

comply with the requirements of 35 USC 112, second paragraph. Accordingly, applicants respectfully request that the rejection of claims 59, 63, and 66, together with the rejection of their respective dependent claims 60, 61, 62, 64-65, and 67-69, be withdrawn.

VII.

In view of the above remarks, applicants submit that claims 44-72 are patentable under 35 USC 112, first and second paragraphs. Thus, applicants respectfully request that the examiner forward the present application and the Maynard patent to the board for the declaration of an interference. The examiner is reminded that the interference may be declared as long as at least one claim of the present application is allowable (see 37 CFR 1.606).

Respectfully submitted,

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VITREOUS SILICA

Vitreous silica [*60676-86-0*] is a glass composed essentially of SiO_2. It has been the subject of considerable study for two reasons. First, it is a material with many unique and useful properties, eg, low thermal expansion, high thermal shock resistance, high ultraviolet transparency, good refractory qualities, dielectric properties, and chemical inertness. A second reason is the simplicity of its chemical constitution. It is one of the relatively few binary oxide glasses and consequently has been investigated by countless chemists, physicists, spectroscopists, and materials scientists. However, vitreous silica is actually a very complicated material whose properties vary with, among other things, raw material, method of manufacture, and thermal history (see also Glass).

The question arises as to why, if vitreous silica has such outstanding properties, it is not used even more extensively. The answer is the high cost of manufacture as compared to most glasses caused by very high viscosity, small temperature coefficient of viscosity, and volatility at forming temperatures. This means that even at 2000°C the melt is very stiff and difficult to shape, particularly by mass production methods, although there are significant research and development efforts aimed at circumventing some of these obstacles.

Vitreous silica is either transparent or nontransparent. The nontransparent fused material contains a large number of microscopic bubbles that create a milky appearance caused by the scattering of light. This material, sometimes called translucent fused silica, is more economical to produce than the transparent type and is often used where optical properties are not important. Another nontransparent type is opaque and is formed by sintering powdered vitreous silica.

Probably the earliest record of vitreous silica was in a communication from Marcet, a physician, to a Dr. Thomson, dated July, 1813. By directing a current of oxygen through the flame of an alcohol lamp, Marcet melted wires of platinum and iron and small needles of quartz.

The properties of vitreous silica were first described in 1839 by a French scientist (1). The glass that he produced had remarkable strength and an elasticity that resembled that of iron; it was not broken up when rapidly cooled from the molten state. As a result of these excellent properties, this glass could be put to many uses including small springs, torsion threads, and high temperature forceps. Furthermore, the sandstone near Paris could be fused into a glass which, instead of being transparent, formed silky white threads and pearl-like droplets. These droplets served as very good imitation pearls because of their high strength and luster.

Splintering during melting creates air lines (see under Manufacture), but if the crystals are heated to a red heat and quenched in water with fracturing into tiny crystals, they can be fused without splintering. This discovery in 1900 has given rise to the clear-fused-quartz industry (2–4).

Methods for the manufacture of translucent vitreous silica by fusion of sand surrounding a graphite rod through which a current is passed and subsequent manipulation of the hot plastic material were patented around the turn of the century (5–8), followed by a patent for feeding powdered quartz crystal into an arc (9).

Vitreous silica occurs sometimes as the result of natural phenomena (10). A bolt